



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,021	04/24/2007	Heiko Pelzer	AT040015US1	7076
65913	7590	09/25/2009	EXAMINER	
NXP, B.V. NXP INTELLECTUAL PROPERTY & LICENSING M/S41-SJ 1109 MCKAY DRIVE SAN JOSE, CA 95131			HU, JENNIFER F	
			ART UNIT	PAPER NUMBER
			2821	
			NOTIFICATION DATE	DELIVERY MODE
			09/25/2009	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/594,021	<b>Applicant(s)</b> PELZER, HEIKO	
	<b>Examiner</b> JENNIFER F. HU	<b>Art Unit</b> 2821	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 06 June 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-25 is/are pending in the application.
- 4a) Of the above claim(s) 10 and 16-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-9,11-15 and 20-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Amendment B received on June 6, 2009 has been entered into the record in accordance with the Request for Continued Examination filed August 6, 2009.

### ***Response to Arguments***

2. Applicant's arguments filed June 6, 2009 have been fully considered but they are not persuasive.

3. Applicant argued that Fig. 1 does not teach that the first radiation electrode and the second radiation electrode are electrically isolated because both the first and second radiation electrodes of Fig. 1 are connected to ground. This is not a convincing argument because the first and second electrodes can still be considered electrically isolated because of the slit that exists between the two electrodes, and each electrode resonates in a unique radio frequency.

4. In response to applicant's argument that Tsubaki teaches that the switching means may be a diode, but does not explicitly teach the switching means is a variable capacitance diode.

Examiner notes that any basic diode has at least an on state and an off state, which can be understood as switching between a very large capacitance or a very small capacitance.

Therefore, any diode may be considered "variable capacitance". Furthermore, Tsubaki teaches in "by turning on and off a switch connected to a control electrode and by increasing or decreasing capacitances which determine both of two frequencies, the resonance frequency of each antenna can be changed," [0055]. Therefore, Tsubaki clearly does teach that by adjusting the state of the diode, the capacitance between the two radiating element is varied. Furthermore, claim 1 may be

Art Unit: 2821

alternatively rejected under 35 U.S.C. 103(a) under Tsubaki in view of Nakamura (EP 1 471 597).

### ***Claim Objections***

5. Claim 21 is objected to because of the following informalities: claim 21 comprises the limitation "the dielectric substrate". There is no antecedent basis for the limitation in this claim. Examiner has interpreted claim 21 to depend on claim 5, where a dielectric substrate is first defined for the purposes of this office action. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 3-7, 9, 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsubaki (previously presented) in view of Nakamura (EP 1 471 597).

As to claim 1, Tsubaki teaches an antenna configuration for a telecommunication device wherein the antenna configuration comprising

a first resonator structure (13, Fig. 1) and a second resonator structure (14, Fig. 1) and a control electrode (18, Fig. 1) said two resonator structures are capacitive coupled to one another and said control electrode being provided and realized for changing the capacitive coupling between the first resonator structure and the second resonator structure ("a control electrode for providing coupling capacitances between the open end of the first radiation electrode and the

Art Unit: 2821

control electrode and between the open end of the second radiation electrode and the control electrode,” abstract) and wherein the control electrode being contactable from outside the antenna configuration and wherein a switching means (19, Fig. 1) being associated with the control electrode, by means of the switching means (19, Fig. 1) the control electrode being connectable to a reference potential (ground symbol, Fig. 1).

Tsubaki does not explicitly teach that the switching means comprises a variable capacitance diode, but does teach that the switching means may be a diode [0051], and that by turning on and off a switch, and thus by increasing or decreasing capacitances which determine both of two frequencies, the resonance frequency may be changed [0055]. Therefore, it would have been obvious to one of ordinary skill in the art that any type of diode switch, such as a variable capacitance diode or varactor may be used in the invention to accomplish the function of switching resonance frequencies.

Furthermore, Nakamura teaches the use of a varactor diode in an antenna configuration for tuning the antenna to different frequencies (abstract). It would have been obvious to one of ordinary skill in the art to modify the diode of Tsubaki with a variable capacitance diode, or varactor diode, as taught by Nakamura if it is desirable to achieve a range of different capacitances, and thus a range of different frequencies.

As to claim 3, Tsubaki teaches the switching means (19, Fig. 1) being designed to connect the control electrode (18, Fig. 1) to ground (ground symbol, Fig. 1).

As to claim 4, Tsubaki teaches the antenna configuration being realized by means of a planar inverted F antenna or a shorted patch antenna or a stub antenna (patch 13 is shorted via connecting electrode 15, Fig. 1).

Art Unit: 2821

As to claim 5, Tsubaki teaches the antenna configuration comprising a dielectric substrate (11, Fig. 1, [0011]) retaining the first resonator structure (13, Fig. 1) and the second resonator structure (14, Fig. 1), the first resonator structure being connected to a feed line (17, Fig. 1) provided on the dielectric substrate, and the second resonator structure, by means of the dielectric substrate being electrically isolated (by slit s1, Fig. 1) from the first resonator structure and being located adjacent to the first resonator structure being connected to ground (15 and 16, Fig. 1 connect first and second resonator structures to ground, respectively).

As to claim 6, Tsubaki teaches the first resonator structure (13, Fig. 1) and the second resonator structure (14, Fig. 1) are realized by printed structures printed on a surface of the dielectric substrate (11, Fig. 1).

As to claim 7, Tsubaki teaches the first resonator structure and the second resonator structure are at least partially located in the interior of the dielectric substrate (where the interior of the dielectric substrate can be interpreted as the central portion of the top surface, where the first and second resonator structures extend from edges of slit s1 to the edges of the substrate).

As to claim 9, Tsubaki teaches the switching means comprises a PIN diode or a semiconductor switch ("a switch ... may be of any construction...for example, an element such as a diode, a transistor, a field-effect transistor, etc," [0051]).

As to claim 11, Tsubaki teaches a telecommunication device ("communication device," [0001]), comprising an antenna configuration according to claim 1.

As to claim 12, Tsubaki teaches a method of operating a telecommunication device comprising an antenna configuration according to claim 1, wherein the antenna configuration comprises a control electrode (18, Fig. 1) said control electrode is contacted from outside the

Art Unit: 2821

antenna configuration and for changing the resonance frequency of the antenna configuration contacting of the control electrode from outside is done by switchably connecting the control electrode to a reference potential (19, Fig. 1).

As to claim 13, Tsubaki teaches the resonance frequency is changed between a first frequency band and a second frequency band ("double resonance is realized by using two antennas, and, by turning on and off a switch connected to a control electrode," [0018]).

As to claim 14, Tsubaki teaches the method substantially as claimed as applied to claim 13 above, but does not teach the resonance frequency is changed between the DCS band and the UMTS band. However, antennas are frequency scaled to operate anywhere desired in a particular design, and the antenna of Tsubaki can easily be tuned to and utilized for the DCS and UMTS frequency bands by one of ordinary skill in the art.

As to claim 15, Tsubaki teaches the resonance frequency is changed within a given frequency band between a first sub-band and a second sub-band ("double resonance...establish a broader bandwidth," [0018] – [0020]).

As to claim 20, Nakamura teaches the variable capacitance diode is configured to enable a continuous change of the resonance frequency of the antenna configuration ("The resonant frequency of the antenna can be changed in response to the amplitude of the DC bias voltage applied to the varactor diode because the additional capacitance of the antenna element effectively changes in response to the capacitance of the varactor diode," [0018]).

As to claim 22, Tsubaki in view of Nakamura do not teach the first resonator structure is sinus-shaped or meander shaped. However, meandering shaped resonant elements are well known in the art and beneficial for reducing the physical length of an antenna element while

Art Unit: 2821

maintaining a desirable electrical length. Therefore, it would have been obvious to one of ordinary skill in the art to modify the first resonator element of Tsubaki by forming it in a meander or sinus shaped in order to miniaturize the antenna configuration.

As to claims 23 and 24, Tsubaki in view of Nakamura do not teach the second resonator structure includes a U-shaped or W-shaped resonator structure and a stripe-shaped, sinus-shaped or meander-shaped auxiliary resonator structure, wherein the U-shaped resonator structure and the stripe-shaped auxiliary resonator structure are contacted to one another. However, resonator structures of different shapes are well known in the art and would have been an obvious modification depending on physical space constraints, the desired operating frequency, etc.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsubaki in view of Nakamura, further in view of Adam (previously presented).

As to claim 8, Tsubaki in view of Nakamura teach the antenna configuration substantially as claimed as applied to claim 7 above, but does not teach the antenna configuration being manufactured by usage of low temperature cofired ceramic technology (LTCC). However, low temperature cofired ceramic technology is well known in the art, as taught by Adam, and one of ordinary skill in the art would have been motivated to use LTCC as the substrate because the high dielectric constants of LTCC's allow the antenna unit to be further miniaturized. The multi-layering capability also allows composite electrical parameters to be handled within a single substrate, thus simplifying the manufacture of the antenna unit.

9. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsubaki in view of Nakamura, further in view of Rowell (WO 01/20718).

Art Unit: 2821

Tsubaki in view of Nakamura teach the antenna configuration substantially as claimed as applied to claim 1 above, but do not explicitly teach that the first and second resonator structures are located entirely in the interior of the dielectric substrate.

Rowell teaches an antenna configuration comprising at least two resonator structures (321, 322, 323, Fig. 3a), wherein the resonator structures are located entirely in the interior of the dielectric substrate (310, Fig. 3a).

All the claimed elements of the invention were known in the prior art and one of ordinary skill in the art could have combined these elements as claimed by known methods and with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

10. Claim 1 is alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Thornell-Pers (US 2009/0066584) in view of Nakamura.

Thornell-Pers teaches an antenna configuration for a telecommunication device wherein the antenna configuration comprising

- a first resonator structure (10, Fig. 2) and

- a second resonator structure (20, Fig. 2) and

- a control electrode (Vswitch, Fig. 2), said two resonator structures are capacitively coupled (32, Fig. 2) to one another and said control electrode being provided and realized for changing the capacitive coupling between the first resonator structure and the second resonator structure, and

- the control electrode being contactable from outside the antenna configuration, wherein

Art Unit: 2821

a switching means (30, Fig. 2) is associated with the control electrode, by means of the switching means the control electrode being connectable to a reference potential.

Thornell-Pers does not teach the switching means comprises a variable capacitance diode. Nakamura teaches the use of a varactor diode in an antenna configuration for tuning the antenna to different frequencies. It would have been obvious to one of ordinary skill in the art to modify the diode of Thornell-Pers with a variable capacitance diode, or varactor diode, as taught by Nakamura if it is desirable to achieve a range of different capacitances, and thus a range of different frequencies.

Thornell-Pers is further considered pertinent to applicant's disclosure that the first resonator structure is connected to the feed, but not connected to ground, and the second resonator structure is connected to ground. This subject matter has not been claimed, but has been argued in previous remarks.

### ***Prior Art Made of Record***

11. Milosavijevic (EP 1 469 549) teaches a multi-band antenna comprising a first resonator structure (422, Fig. 4), a second resonator structure (430, Fig. 4) capacitively coupled to the first resonator structure, and a switching means (SW, Fig. 4) for changing the coupling between the first and second resonator structures.

12. Hani (US 6,819,290) teaches a variable multi-band planar antenna assembly comprising a first resonator structure (1330, Fig. 13), a second resonator structure (1350, Fig. 13) capacitively coupled to the first resonator structure, and a switching means (1365, Fig. 13) for changing the coupling between the first and second resonator structures.

Art Unit: 2821

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER F. HU whose telephone number is (571) 270-3831. The examiner can normally be reached on Monday-Friday 9:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas Owens can be reached on (571) 272-1662. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JENNIFER F HU/  
Examiner, Art Unit 2821

/Douglas W Owens/  
Supervisory Patent Examiner, Art Unit 2821  
September 21, 2009